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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
KIM, HEE-YONG	
ART UNIT	PAPER NUMBER
2482	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/587,638	ERSUE ET AL.	
	Examiner	Art Unit	
	HEE-YONG KIM	2482	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 July 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *28 July 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *7/28/2006, 1/6/2009, and 1/11/2010*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. **Claims 1-3, 6, and 8-9** are rejected under 35 U.S.C. 102(b) as being anticipated by Rankin (US 2002/0,169,586), hereafter referenced as Rankin.

Regarding **claim 1**, Rankin discloses Automated CAD Guided Sensor Planning Process. Specifically Rankin discloses A method for planning an inspection path (2) (CAD-guided sensor path planning system, paragraph 33) for at least one optical picture-taking device (4), particularly a camera (digital camera, paragraph 27), for inspecting (selective part inspection, paragraph 32) a three- dimensional object (3) (3-D object, paragraph 6), with which the picture-taking device (4) and the object (3) are movable relative to each other using a displacement device (5, 6) (CMM or Robot, paragraph 21), wherein, based on the design data (8), particularly CAD data (CAD model 12, Fig.1) and/or data determined by a sensor, of the object (3) and/or an area (12) to be inspected (selected area of part under inspection, paragraph 32) on the object, and based on the optical imaging characteristics (resolution, field of view, focal length, paragraph 20) of the picture-taking device (4), stored in electronic form (CAD model as stored in a computer), and by using an arithmetic logic unit (10) (Pentium PC,

paragraph 31), the inspection path (2) (sensor path configuration, paragraph 33) for the optical picture-taking device (4) is automatically determined (sensor planner automatically determines various viewing positions and orientations, paragraph 10) by specifying a specific geometric relationship between the picture-taking device (4) and the surface to be inspected (orient sensor with respect to the direction of view, paragraph 29).

Regarding **claim 2**, Rankin discloses everything claimed as applied above (see claim 1). Rankin further discloses wherein the optical picture-taking device (4) is guided over the stationary (CMM or Robot positions the sensor or camera, paragraph 21) or moving object (3).

Regarding **claim 3**, Rankin discloses everything claimed as applied above (see claim 1). Rankin further discloses wherein picture-taking positions of the picture-taking device (4) are determined by covering the entire three-dimensional object (3) or all areas (12) (entire surfaces of the part to be measured, paragraph 21) to be inspected on the object with pictures that were taken.

Regarding **claim 6**, Rankin discloses everything claimed as applied above (see claim 1). Rankin further discloses wherein a motion sequence for the relative motion between the object (3) and the picture- taking device (4) and/or the illumination device is determined from the inspection path (2) (appropriately position sensor in accordance with determined viewing positions and orientations, paragraph 21).

Regarding **claim 8**, Rankin discloses everything claimed as applied above (see claim 1). Rankin further discloses wherein an area (12) to be inspected within the picture is assigned (Fig.2) to each picture of the optical picture-taking device (4).

Regarding **claim 9**, Rankin discloses everything claimed as applied above (see claim 8). Rankin further discloses wherein a check is carried out based on the area (12) to be inspected and the inspection path (2) to determine whether the object (3) defined by the design data (8) or the entire area (12) to be inspected on the object (3) defined by the design data (8) is completely covered (Fig.2: automated CAD-guided sensor planning).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. **Claims 4-5, and 10** are rejected under 35 U.S.C. 103(a) as being unpatentable over Rankin in view of Albeck (US 6,167,151), hereafter referenced as Albeck.

Regarding **claim 4**, Rankin discloses everything claimed as applied above (see claim 3). However, Rankin fails to disclose wherein points in time for taking pictures are determined with consideration for displacement information (11) of the displacement device (5, 6) and the picture- taking positions of the picture-taking device (4).

In the similar field of endeavor, Albeck discloses Apparatus and Method for 3-dimensional Surface Geometry Reconstruction. Albeck specifically teaches wherein points in time for taking pictures are determined (Examiner read as picture should be taken when the displacement position correspond to planned viewing position) with consideration for displacement information of the displacement device (Object assembly 44, mast 33, Fig.1) and the picture- taking positions of the picture-taking device (optical head 30, Fig.1), in order to allow overlapping portions of the object of interest to be imaged in a predetermined sequence (col.5, line 16-23).

Therefore, given this teaching, it would have been obvious to one of ordinary skill in the art at the time invention was made to modify Rankin by providing specifically displacement devices (Object assembly 44 and mast 33) and taking picture when the displacement position correspond to planned viewing position, in order to allow overlapping portions of the object of interest to be imaged in a predetermined sequence. The Rankin Automatic CAD Guided Sensor Process, incorporating the Albeck displacement devices (Object assembly 44 and mast 33) and taking picture when the displacement position correspond to planned viewing position, has all the features of claim 4.

Regarding **claim 5**, Rankin discloses everything claimed as applied above (see claim 1). Rankin further discloses wherein the inspection path is determined by specifying a specific geometric relationship (sensor planner automatically determines various viewing positions and orientations, paragraph 10) between the picture-taking

device and the surface to be inspected. However, Rankin fails to disclose wherein an illumination device is assigned to the picture-taking device.

Albeck discloses wherein an illumination device (illumination lamp 108, Fig.2) is assigned to the picture-taking device (Camera 104, Fig.2), in order to generate reference pattern on the object of interest (col.7, line 1-15).

Therefore, given this teaching, it would have been obvious to one of ordinary skill in the art at the time invention was made to modify Rankin by providing specifically illumination device, in order to in order to generate reference pattern on the object of interest. The Rankin Automatic CAD Guided Sensor Process, incorporating the Albeck illumination device, has all the features of claim 5.

Regarding **claim 10**, Rankin discloses everything claimed as above (see claim 1). However Rankin fails to disclose wherein the inspection path (2) and/or the areas (12) to be inspected and that have been defined on an object (3) are visualized on a display means, particularly a screen.

Albeck specifically discloses inspection path (2) and/or the areas (12) to be inspected and that have been defined on an object (3) are visualized (superimpose the path on the CAD model, col.9, line 59-66) on a display means, particularly a screen (monitor screen is a part of PC), in order to show the inspection path in the object.

Therefore, given this teaching, it would have been obvious to one of ordinary skill in the art at the time invention was made to modify Rankin by providing specifically superimposing the inspection path on CAD model, in order to show the inspection path in the object. The Rankin Automatic CAD Guided Sensor Process, incorporating the

Albeck superimposing the inspection path on CAD model, has all the features of claim 10.

1. **Claims 7** is rejected under 35 U.S.C. 103(a) as being unpatentable over Rankin in view of Rajagopal (US 2002/0,141,645), hereafter referenced as Rajagopal.

Regarding **claim 7**, Rankin discloses everything claimed as applied above (see claim 6). However, Rankin fails to disclose wherein the inspection time and/or inspection path are kept as short as possible in the determination of the motion sequences.

In the similar field of endeavor, Rajagopal discloses System and Method for Scanning A Region Using Low Discrepancy Curve. Rajagopal specifically discloses the motion planning with shortest time or path as design goals (paragraph 5 and 6).

Therefore, given this teaching, it would have been obvious to one of ordinary skill in the art at the time invention was made to modify Rankin by providing specifically wherein the inspection time and/or inspection path are kept as short as possible in the determination of the motion sequences, in order to achieve the shortest inspection time. The Rankin Automatic CAD Guided Sensor Process, incorporating the Rajagopal the motion planning with shortest time or path, has all the features of claim 7.

5. **Claims 11-12, and 14** are rejected under 35 U.S.C. 103(a) as being unpatentable over Rankin in view of Claridge (WO 87/00629), hereafter referenced as Claridge.

Regarding **claim 11**, Rankin discloses A method for determining areas (12) (Selective part inspection (SPI), paragraph 32 and 33) to be inspected on a surface of a three-dimensional object (3) based on design data (8) (CAD model 12, Fig.1) available in electronic form, particularly CAD data, relating to the object (3) (describe geometric object, paragraph 19). However, Rankin fails to disclose wherein it is specified for certain areas (12, 13) on the object whether and in which manner these areas (12, 13) are to be inspected, and that, during the inspection with a picture-taking device (4), these areas (12) to be inspected are assigned to the pictures that were actually taken.

In the analogous filed of endeavor, Claridge discloses Inspection Apparatus. Claridge specifically discloses inspection of complex painting surface is difficult because there are other features such as mouldings or creases which are similar to defects and mean should be provided in order to distinguish between real defects and features of surface (col.3, line 13-24).

Therefore, given this teaching, it would have been obvious to one of ordinary skill in the art at the time invention was made to modify Rankin by providing specifically specifying areas to be inspected or not to be inspected in the complex painting surface and path planning by reducing coverage of area not to be inspected, and assigning areas to be inspected or not to be inspected to the pictures that were actually taken during inspection, in order to refine inspected area to avoid the false alarm of defects. The Rankin Automatic CAD Guided Sensor Process, incorporating the Claridge complex painting surface with false defect associated with moulding, further incorporating specifying areas to be inspected or not to be inspected in the complex

painting surface and path planning by reducing coverage of area not to be inspected, and assigning areas to be inspected or not to be inspected to the pictures that were actually taken during inspection, has all the features of claim 11.

Regarding **claim 12**, Rankin and Claridge disclose everything claimed as applied above (see claim 11). However, Rankin and Claridge fail to disclose wherein areas (12) to be inspected, areas (13) not to be inspected, and/or areas (12) to be inspected in a certain manner are determined automatically based on the design data (8), particularly by determining geometric shapes or other parameters.

However, it was obvious to exclude moulding from inspected area based on CAD data by geometric shape of moulding, in order to avoid the false alarm of defects. The Rankin Automatic CAD Guided Sensor Process, incorporating the Claridge complex painting surface with false defect associated with moulding, further incorporating specifying areas to be inspected or not to be inspected in the complex painting surface and path planning by reducing coverage of area not to be inspected, and assigning areas to be inspected or not to be inspected to the pictures that were actually taken during inspection, further incorporating excluding moulding from inspected area based on CAD data by geometric shape of moulding, has all the features of claim 12.

Regarding **claim 14**, Rankin and Claridge disclose everything claimed as applied above (see claim 12). However, Rankin fails to disclose wherein the automatically generated areas (12) to be inspected are capable of being processed manually.

However, it was obvious to switch automatic to manual mode, in order to do human interactive mode.

6. **Claims 13 and 15** are rejected under 35 U.S.C. 103(a) as being unpatentable over Rankin in view of Claridge, further in view of Albeck.

Regarding **claim 13**, Rankin and Claridge disclose everything claimed as applied above (see claim 11). However, Rankin and Claridge fail to disclose wherein the areas (12) to be inspected are stored and/or visualized as calculated pictures (14).

Albeck specifically discloses wherein the areas to be inspected are stored and/or visualized as calculated pictures (superimpose the path on the CAD model, col.9, line 59-66), in order to show the inspection path in the object.

Therefore, given this teaching, it would have been obvious to one of ordinary skill in the art at the time invention was made to modify Rankin and Claridge by providing specifically superimposing the inspection path on CAD model, in order to show the inspection path in the object. The Rankin Automatic CAD Guided Sensor Process, incorporating the Claridge complex painting surface with false defect associated with moulding, further incorporating specifying areas to be inspected or not to be inspected in the complex painting surface and path planning by reducing coverage of area not to be inspected, and assigning areas to be inspected or not to be inspected to the pictures that were actually taken during inspection, further incorporating superimposing the inspection path on CAD model, has all the features of claim 13.

Regarding **claim 15**, Rankin and Claridge disclose everything claimed as applied above (see claim 11). However, Rankin and Claridge fail to disclose wherein the calculated pictures (14) with the areas (12) to be inspected and/or a visualization of the areas (12) to be inspected are displayed in the pictures that were actually taken.

Albeck specifically discloses wherein the calculated pictures (14) with the areas (12) to be inspected and/or a visualization of the areas (12) to be inspected are displayed in the CAD model (superimpose the path on the CAD model, col.9, line 59-66). However, Albeck fails to disclose displaying visualization of the areas (12) to be inspected in the pictures that were actually taken.

However, it was obvious to try superimposing the area to be inspected in the pictures that were actually taken, in order to verify the coverage of inspection. The Rankin Automatic CAD Guided Sensor Process, incorporating the Claridge complex painting surface with false defect associated with moulding, further incorporating specifying areas to be inspected or not to be inspected in the complex painting surface and path planning by reducing coverage of area not to be inspected, and assigning areas to be inspected or not to be inspected to the pictures that were actually taken during inspection, further incorporating superimposing the inspection path in the pictures that were actually taken, has all the features of claim 15.

7. **Claim 16** is rejected under 35 U.S.C. 103(a) as being unpatentable over Rankin in view of Gupta (US 5,715,167), hereafter referenced as Gupta.

Regarding **claim 16**, Rankin discloses everything claimed as above (see claim 1). Rankin further discloses wherein features in the areas (2) to be inspected and that were determined from the design data (8) are compared with the features recognizable in the pictures that were taken (scanned information is compared to CAD model, paragraph 36). However, Rankin fails to disclose that a position correction is carried out, if necessary, based on the results of the comparison.

In the analogous filed of endeavor, Gupta discloses Fixture for Calibrated Positioning of An Object. Gupta specifically discloses that a position correction is carried out, if necessary, based on the results of the comparison (calibration when comparing the model of part to CAD model, col.3, line 56-62), in order to determine correct positioning of the part (col.3, line 56-62).

Therefore, given this teaching, it would have been obvious to one of ordinary skill in the art at the time invention was made to modify Rankin by providing specifically calibrating CAD model by the comparison between model and image taken, in order to determine correct positioning of the part. The Rankin Automatic CAD Guided Sensor Process, incorporating the Gupta calibrating CAD model by the comparison between model and image taken, has all the features of claim 16.

8. **Claims 17-18** are rejected under 35 U.S.C. 103(a) as being unpatentable over Rankin in view of Pryor (US 5,706,408), hereafter referenced as Pryor.

Regarding **claim 17**, Rankin disclose everything claimed as above (see claim 1). However, Rankin fails to disclose wherein the optical picture-taking device (4) is calibrated three-dimensionally.

In the analogous filed of endeavor, Pryor discloses Target Based Determination of Robot and Sensor Alignment. Pryor specifically discloses wherein the optical picture-taking device (4) is calibrated three-dimensionally (the sensor units are calibrated automatically relative to math data base of CAD, col.2, line 31-43), in order to position robot accurately (col.2, line 21-29).

Therefore, given this teaching, it would have been obvious to one of ordinary skill in the art at the time invention was made to modify Rankin by providing specifically calibrating optical sensor relative to CAD model, in order to in order to position robot accurately. The Rankin Automatic CAD Guided Sensor Process, incorporating the Pryor calibrating optical sensor relative to CAD model, has all the features of claim 17.

Regarding **claim 18**, The Rankin Automatic CAD Guided Sensor Process, incorporating the Pryor calibrating optical sensor relative to CAD model, as applied to claim 17, teaches wherein a fine-positioning of the object (3) in the picture is carried out (Pryor: sensor units look at these positions, col.2, line 31-43)).

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to HEE-YONG KIM whose telephone number is (571)270-3669. The examiner can normally be reached on Monday-Thursday, 8:00am-5pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marsha Banks-Harold can be reached on 571-272-7905. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/HEE-YONG KIM/
Examiner, Art Unit 2621

/Andy S. Rao/
Primary Examiner, Art Unit 2482
November 18, 2010